

Claims

- [c1] An apparatus for depositing a ceramic coating on a surface of a component, the apparatus comprising:
- a single evaporation source containing multiple different oxide compounds, at least one of the oxide compounds having a vapor pressure that is higher than the remaining oxide compounds;
 - means for introducing the evaporation source into a coating chamber;
 - means for suspending the component near the evaporation source;
 - means for projecting a high-energy beam on the evaporation source to melt and form a vapor cloud of the oxide compounds of the evaporation source;
 - means for preventing the vapor cloud from contacting and condensing on the component during an initial phase in which the relative amount of the at least one oxide compound in the vapor cloud is greater than the relative amount of the at least one oxide compound in the evaporation source; and
 - means for removing the preventing means to allow the vapor cloud to contact and condense on the component to form the coating during a subsequent phase in which

the relative amount of the at least one oxide compound in the vapor cloud is approximately equal to the relative amount of the at least one oxide compound in the evaporation source.

[c2] An apparatus according to claim 1, wherein the preventing means is a barrier positioned between the component and the evaporation source, and the removing means is operable to remove the barrier from between the component and the evaporation source.

[c3] An apparatus according to claim 1, wherein the at least one oxide compound is selected from the group consisting of ceria, magnesia, strontia, barium oxide, lanthana, neodymia, gadolinium oxide, dysprosia, ytterbia and tantala.

[c4] An apparatus according to claim 3, wherein the evaporation source consists essentially of yttria, zirconia and the at least one oxide compound.

[c5] An apparatus according to claim 4, wherein the at least one oxide compound is ceria.

[c6] An apparatus according to claim 1, wherein the evaporation source consists essentially of yttria, zirconia and the at least one oxide compound.

- [c7] An apparatus according to claim 1, wherein the at least one oxide compound is ceria.
- [c8] An apparatus according to claim 1, wherein the evaporation source contains about 10 to about 20 weight percent ceria, the balance essentially zirconia stabilized by about 3 to about 8 weight percent yttria.
- [c9] An EBPVD apparatus for depositing a ceramic coating on a surface of a component, the apparatus comprising:
a single ingot containing yttria-stabilized zirconia and at least one oxide compound having a vapor pressure that is at least an order of magnitude higher than yttria and zirconia;
means for introducing the ingot into a coating chamber;
means for suspending the component near the evaporation source;
means for projecting an electron beam on the ingot to melt and form a vapor cloud containing ions of yttria, zirconia and the oxide compound;
a barrier operable to be positioned between the ingot and the component to prevent the vapor cloud from contacting and condensing on the component during an initial phase in which the relative amount of the oxide compound in the vapor cloud is greater than the relative amount of the oxide compound in the ingot; and
means for removing the barrier to allow the vapor cloud

to contact and condense on the component to form the coating during a subsequent phase in which the relative amount of the oxide compound in the vapor cloud is approximately equal to the relative amount of the oxide compound in the ingot.